

What is Claimed is:

1. An apparatus for presenting sample racks to an automated analyzer, comprising:
 - a. a sample rack onload section, a sample rack presentation section, and a sample rack offload section;
 - 5 b. said sample rack onload section having an onload queue area, and an onload moving mechanism for moving said sample racks placed on said onload queue area to said sample rack presentation section;
 - 10 c. said sample rack presentation section having a transfer area connected to said onload queue area of said sample rack onload section for receiving said sample racks from said sample rack onload section, a sample presentation area adjacent to said automated analyzer for presenting sample racks for aspiration, and a presentation moving mechanism, movable between said transfer area and said presentation area for moving at least one of said sample racks from said transfer area to said presentation area for a sample aspiration and subsequently moving said at least one of said sample racks from said presentation area back to said transfer area after a sample aspiration; and
 - 15 d. said sample rack offload section having an offload area connected to said transfer area of said sample rack presentation section for receiving said sample racks from said sample rack presentation section after a sample aspiration, and an offload moving mechanism for moving said sample racks received from said sample rack presentation section to a sample rack offload tray.
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2. The apparatus as defined in claim 1, wherein said onload moving mechanism of said sample racks onload section comprises an onload pusher driven by an onload motor and capable of pushing either an individual one or a group of said sample racks.
- 25 3. The apparatus as defined in claim 1, further comprising an onload sensor for detection of motion errors or jams of said onload moving mechanism.
- 30 4. The apparatus as defined in claim 1, wherein said presentation moving mechanism of said sample racks presentation section further comprises means for simultaneously moving a multiplicity of said sample racks.

5. The apparatus as defined in claim 4, wherein said simultaneous moving means comprises a presentation tray driven by a presentation motor and capable of holding said multiplicity of said sample racks.
6. The apparatus as defined in claim 1, further comprising a bar code reader for obtaining identification of said sample racks, or of one or more sample containers held by said sample racks, or of sample contents contained in said containers.
7. The apparatus as defined in claim 6, wherein said bar code reader obtains identification of a subject sample rack, or of one or more sample containers held by said subject sample rack, or of sample contents contained in said containers held by said subject sample rack, prior to presenting said subject sample rack to an aspiration location of said automated analyzer for aspiration.
8. The apparatus as defined in claim 1, further comprising a presentation sensor for detection of motion errors or jams of said presentation moving mechanism.
9. The apparatus as defined in claim 1, further comprising an alignment mechanism for precise positioning of a sample rack presented for aspiration.
10. The apparatus as defined in claim 9, wherein said alignment mechanism comprises means for precise positioning of said presented sample rack along a lengthwise direction of said presented sample rack.
11. The apparatus as defined in claim 10, wherein said lengthwise direction precise positioning means comprises a spring-biased plunger engageable with said presented sample rack.
12. The apparatus as defined in claim 9, wherein said alignment mechanism further comprises means for precise positioning of said presented sample rack along a transverse direction of said presented sample rack.
13. The apparatus as defined in claim 12, wherein said transverse direction precise positioning means comprises a lead-in slot engageable with an engagement feature of said presented sample rack.
14. The apparatus as defined in claim 1, wherein said offload moving mechanism of said sample racks offload section comprises an offload pusher driven by an offload motor and capable of pushing either an individual one or a group of said sample racks.

15. The apparatus as defined in claim 1, further comprising an offload sensor for detection of motion errors or jams of said offload moving mechanism.
16. The apparatus as defined in claim 1, wherein said sample rack onload section, said sample rack presentation section, and said sample rack offload section are connected as one unit such that they can be moved together while maintaining their alignment.
17. The apparatus as defined in claim 1, further comprising electronic means coupled with said automated analyzer for integrated control and operation.
18. An apparatus for presenting sample racks to an automated analyzer, comprising:
 - a. a sample rack onload section having an elongated rail having a distal end and a proximal end, and an onload moving mechanism movable along said rail for moving said sample racks placed on said rail towards said proximal end of said rail;
 - b. an onload sensor located adjacent to said proximal end of said rail of said sample rack onload section for detection of motion errors or jams of said onload moving mechanism;
 - c. a sample rack presentation section having a transfer area connected to said proximal end of said rail of said sample rack onload section for receiving said sample racks from said sample rack onload section, a sample presentation area adjacent to said automated analyzer for presenting sample racks for aspiration, and a presentation moving mechanism movable between said transfer area and said presentation area for moving at least one of said sample racks from said transfer area to said presentation area for sample aspiration and subsequently moving said at least one of said sample racks from said presentation area back to said transfer area after sample aspiration;
 - d. a presentation sensor located at said presentation area of said sample rack presentation section for detection of motion errors or jams of said presentation moving mechanism;
 - e. a sample rack offload section having an offload area connected to said transfer area of said sample rack presentation section for receiving said sample racks from said sample rack presentation section after a sample

aspiration, and an offload moving mechanism for moving said sample racks received from said sample rack presentation section to a sample rack offload tray; and

5 f. an offload sensor located at said offload queue area of said sample rack offload section for detection of motion errors or jams of said offload moving mechanism.

19. The apparatus as defined in claim 18, wherein said onload moving mechanism of said sample racks onload section comprises an onload pusher capable of pushing either an individual one or a group of said sample racks.

10 20. The apparatus as defined in claim 18, wherein said onload moving mechanism of said sample racks onload section further comprises an onload motor for driving said onload pusher.

21. The apparatus as defined in claim 18, wherein said presentation moving mechanism of said sample racks presentation section further comprises means for simultaneously moving a multiplicity of said sample racks.

15 22. The apparatus as defined in claim 21, wherein said simultaneous moving means comprises a presentation tray driven by a presentation motor and capable of holding said multiplicity of said sample racks.

20 23. The apparatus as defined in claim 18, further comprising a bar code reader for obtaining the identification of said sample racks, or of one or more sample containers held by said sample racks, or of sample contents contained in said containers.

24. The apparatus as defined in claim 23, wherein said bar code reader obtains the identification of a subject sample rack, or of one or more sample containers held by said subject sample rack, or of sample contents contained in said containers held by said subject sample rack, prior to presenting said subject sample rack to an aspiration location of said automated analyzer for aspiration.

25 25. The apparatus as defined in claim 18, further comprising an alignment mechanism for the precise positioning of a sample rack presented for aspiration.

30 26. The apparatus as defined in claim 25, wherein said alignment mechanism comprises means for the precise positioning of said presented sample rack along a lengthwise direction of said presented sample rack.

27. The apparatus as defined in claim 26, wherein said lengthwise direction precise positioning means comprises a spring-biased plunger engageable with said presented sample rack.
28. The apparatus as defined in claim 25, wherein said alignment mechanism further
5 comprises means for the precise positioning of said presented sample rack along a transverse direction of said presented sample rack.
29. The apparatus as defined in claim 28, wherein said transverse direction precise positioning means comprises a lead-in slot engageable with an engagement feature of said presented sample rack.
- 10 30. The apparatus as defined in claim 18, wherein said offload moving mechanism of said sample racks offload section comprises an offload pusher driven by an offload motor and capable of pushing either an individual one or a group of said sample racks.
31. The apparatus as defined in claim 30, wherein said offload moving mechanism of
15 said sample racks offload section comprises an offload pusher capable of pushing either an individual one or a group of said sample racks.
32. The apparatus as defined in claim 31, wherein said offload moving mechanism of said sample racks offload section further comprises an offload motor for driving said offload pusher.
- 20 33. The apparatus as defined in claim 11, wherein said sample rack onload section, said sample rack presentation section and said sample rack offload section are connected as one unit such that they can be moved together while maintaining their alignment.
34. The apparatus as defined in claim 11, further comprising electronic means coupled
25 with said automated analyzer for integrated control and operation.
35. An apparatus for presenting sample racks to an automated analyzer, comprising:
 - a. a sample rack onload section having an elongated rail having a distal end and a proximal end, and an onload moving mechanism further comprising an onload pusher movable along said rail for moving said sample racks
30 placed on said rail towards said proximal end of said rail;

- b. an onload sensor located adjacent to said proximal end of said rail of said sample rack onload section for the detection of motion errors or jams of said onload moving mechanism;
- 5 c. a sample rack presentation section having a transfer area connected to said proximal end of said rail of said sample rack onload section for receiving said sample racks from said sample rack onload section, a sample presentation area adjacent to said automated analyzer for presenting sample racks for aspiration, and a presentation moving mechanism for moving at least one of said sample racks from said transfer area to said presentation area for a sample aspiration and subsequently moving said at least one of said sample racks from said presentation area back to said transfer area after sample aspiration;
- 10 d. a presentation sensor located at said presentation area of said sample rack presentation section for the detection of motion errors or jams of said presentation moving mechanism;
- 15 e. a sample rack offload section having an offload area connected to said transfer area of said sample rack presentation section for receiving said sample racks from said sample rack presentation section after a sample aspiration, and an offload moving mechanism further comprising an offload pusher for moving said sample racks received from said sample rack presentation section to a sample rack offload tray;
- 20 f. an offload sensor located at said offload queue area of said sample rack offload section for the detection of motion errors or jams of said offload moving mechanism; and
- 25 g. a bar code reader for obtaining the identification of said sample racks, or of one or more sample containers held by said sample racks, or of sample contents contained in said containers.
36. The apparatus as defined in claim 35, wherein said onload moving mechanism of said sample racks onload section further comprises an onload motor for driving said onload pusher.
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37. The apparatus as defined in claim 35, wherein said presentation moving mechanism of said sample racks presentation section further comprises the means for simultaneously moving a multiplicity of said sample racks.
38. The apparatus as defined in claim 37, wherein said simultaneous moving means comprises a presentation tray driven by a presentation motor and capable of holding said multiplicity of said sample racks.
39. The apparatus as defined in claim 35, wherein said bar code reader obtains the identification of a subject sample rack, or of one or more sample containers held by said subject sample rack, or of sample contents contained in said containers held by said subject sample rack, prior to presenting said subject sample rack to an aspiration location of said automated analyzer for aspiration.
40. The apparatus as defined in claim 35, further comprising an alignment mechanism for the precise positioning of a sample rack presented for aspiration.
41. The apparatus as defined in claim 40, wherein said alignment mechanism comprises the means for the precise positioning of said presented sample rack along a lengthwise direction of said presented sample rack.
42. The apparatus as defined in claim 41, wherein said lengthwise direction precise positioning means comprises a spring-biased plunger engageable with said presented sample rack.
43. The apparatus as defined in claim 40, wherein said alignment mechanism further comprises the means for the precise positioning of said presented sample rack along a transverse direction of said presented sample rack.
44. The apparatus as defined in claim 43, wherein said transverse direction precise positioning means comprises a lead-in slot engageable with an engagement feature of said presented sample rack.
45. The apparatus as defined in claim 35, wherein said offload moving mechanism of said sample racks offload section further comprises an offload motor for driving said offload pusher.
46. The apparatus as defined in claim 35, wherein said sample rack onload section, said sample rack presentation section and said sample rack offload section are connected as one unit such that they can be moved together while maintaining their alignment.

47. The apparatus as defined in claim 35, further comprising electronic means coupled with said automated analyzer for integrated control and operation.